AGRICULTURAL NEWS LETTER

VOL. 26 No. 1 WINTER 1957-58

This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations by the Du Pont Company. It also contains published reports of investigators at agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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ISSUED BY PUBLIC RELATIONS DEPARTMENT, E. I. DU PONT DE NEMOURS & CO. (INC.), WILMINGTON 98, DEL.

AGRICULTURAL NEWS LETTER

Published Quarterly by the Public Relations Dept.
E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Wilmington 98, Delaware
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THE AGRICULTURAL NEWS LETTER serves as a medium of reporting new developments and ideas in agriculture, particularly those related to advancements through research. Material herein may be reprinted in whole or in part, in the interest of advancing the general knowledge of new agricultural practices.

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AGRICULTURE'S STAKE IN TODAY'S TALENT HUNT

The industrial world has, for some time, been conducting an energetic search for talent. The growing complexity of manufacturing and marketing has increased enormously the need for highly developed skills — both technical and managerial. In many companies, these categories account for one-third to one-half of all employees. And the trend is likely to continue as automated processes increase and market research discovers better methods of anticipating and satisfying consumer desires. Meanwhile, American universities are straining every sinew to train bright young people to meet the need.

Often overlooked in the cry for more engineers, researchers, and better young executives, is a similar need for well-trained talent on the nation's farms. Despite its technological successes in the last half-century — successes which have filled the American larder to overflowing — agriculture is beset by many tough economic problems. These problems challenge the finest minds, educated in the best American traditions, to find a viable solution.

Talent For Business Vital

For the truth is that farming is now both a science and a business, and must be conducted according to the best principles and techniques of each. (Harvard Professor John Davis has even coined a new term, "Agribusiness", that partly describes the enlarged responsibilities of the farmer.) To be successful today, the farmer must know more than how to wring the most bountiful crops from his soil or how to breed prize-winning animals. He must be a good bookkeeper, a practical engineer, a market analyst, and an industrious researcher into the literature treating his own brand of farming. These are the skills that the best schools now teach in addition to the more technical aspects of soil and animal husbandry.

All Sciences Need Equal Stress

It would be a grave mistake for the American society to place such undue stress on the need for scientists and business administrators that the best youth now growing up on the farms fail to see in superior farming endeavor a challenge as stimulating as the others. As Du Pont's President Crawford H. Greenewalt pointed out in a recent speech, our history has shown that sound progress rests upon the full advance of human knowledge in all of its many interrelated disciplines. Real progress in the future will be made only if all branches of learning move forward in an unbroken front.

Businesses like Du Pont recognize in the farm industry a major supplier of raw materials and a principal consumer of their products. Both business and agriculture will be best served if farming as a vocation continues to attract the most intelligent and industrious boys growing up on the farm, and if our educational institutes are dedicated to graduating "agribusinessmen" as well as nuclear physicists.

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NEBURON: Newest of the substituted urea herbicides

by P. L. POULOS*
Agricultural and Service Development Representative
Grasselli Chemicals Department
E. I. du Pont de Nemours & Co. (Inc.)

Since the commercial introduction of monuron several years ago, the substituted urea herbicides have become recognized as an extremely versatile group of compounds. Du Pont has prepared and studied a great many herbicidal compounds in this family. Both monuron and the newer diuron are now familiar as commercial products. Neburon was introduced commercially a few months ago.

The introduction of monuron brought a new concept into both agricultural and industrial weed control. For agriculture, it was the first compound which could be applied to the soil at extremely low rates to give long-lasting residual control of weed seedlings. At application rates of one to four pounds per acre, properly timed, both monuron and diuron have proved to be useful as selective weed killers in many crops.

Differences in Solubility

Difference in water solubility among the substituted ureas is one characteristic which gives this family of herbicides their versatility. Diuron is safer to use on certain crops than monuron. One of the reasons for this is that diuron is only about one-sixth as soluble as monuron. Diuron has a solubility of about 40 p. p. m., while the solubility of monuron is 230 p. p. m.

Neburon has an even lower water solubility — 5 p. p. m. — which may give it a place for chemical weed control in crops where other compounds have not been successful.

Neburon is the accepted generic name for the chemical compound, 1-n-butyl-3-(3,4-dichlorophenyl)-1-methylurea. It is a white crystalline compound with a melting point a little higher than the boiling point of water. The compound has an exceptionally low order of toxicity to warm-blooded animals, and presents no unusual hazard in handling, application, or in normal use of treated areas by people and animals. In addition to its low water solubility, it is only sparingly soluble in common hydrocarbon solvents.

Control in Ornamentals

Neburon is now registered for use as "Karmex" N neburon herbicide in commercial plantings of certain ornamental evergreens in the eastern states, for control of annual weeds and grasses. "Karmex" N is a wettable powder, containing 18.5 per cent neburon. This formulation can be successfully applied in any sprayer with good agitation in the tank. With slotted screens, up to 35 pounds of the product (six pounds of active ingredient) can be mixed and applied in as little as 80 gallons of water.

In addition to the registered use, there is a good deal of promising experimental evidence to indicate that rates ranging from two to four pounds of active ingredient per treated acre can be used for selective weed control in other ornamental species and in certain horticultural and agricultural crops. These include about twenty ornamental species: tomatoes, strawberries, lima beans, pole beans, spinach, onions, carrots, peas, celery, soy beans, birdsfoot trefoil, dichondra seed fields, potatoes, lettuce, peppers, gladioli, caneberries, and freshly seeded alfalfa.

Application of Chemical

Optimum use levels for neburon are in the range of from two to four pounds of active ingredient per treated acre. The two-pound rate has been found to be sufficient where the weed population consists largely of particularly susceptible species such as pigweed, mustard, water grass, and chickweed. Three pounds applied pre-weed emergence will control most annual broadleaf species but may permit some of the annual grass plants to survive. At four pounds per acre, neburon has provided excellent control of mixed annual weed population for six weeks or longer. By limiting treatment to a band over the row, the chemical requirement per crop acre can be held to half or one quarter of this recommendation.

Excerpts from a paper by P. L. Poulos presented before the Northeast Weed Conference, New York, January 8 to 10, 1958.

Agricultural News Letter
Public Relations Department
E. I. du Pont de Nemours & Company (Inc.)
Wilmington 98, Delaware

BULLETIN

You may be interested in the current status of methoxychlor as a fly control material for dairy cattle. Following several months of consideration by Du Pont and Federal agencies, final action was taken by the U. S. Department of Agriculture and the Food and Drug Administration after this issue had gone to press.

The net result of all this is that methoxychlor remains in good standing for direct application to dairy cattle as a dust, and for use as a spray in dairy buildings. It is no longer recommended for direct application to dairy animals by spray or dip. It is the only residual chlorinated hydrocarbon insecticide permitted to be used directly on dairy cattle.

As you may have already learned from other sources, the Food and Drug Administration established a zero tolerance for methoxychlor in milk on January 17, which permits use of the insecticide only in ways which result in no residue. This action was based on the report of an advisory committee which considered milk not merely as another raw agricultural commodity under the Pesticide Amendment but took into account the special place of milk in the diet of infants, children, the sick and the aged. In this case, a greater margin of safety has been established for milk than for any other item in the human diet.

The label text for "Marlate" 50 fifty per cent methoxychlor wettable powder insecticide, which was registered with the U. S. Department of Agriculture as of January 10, 1958, is in accord with the action of the Food and Drug Administration setting a zero tolerance for methoxychlor in milk.

If you have any further questions, please feel free to call on us.

O. J. Dekom, Editor
Agricultural News Letter

OJD:jb

A Way of Life

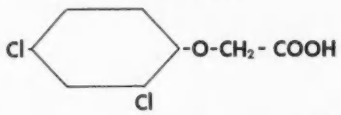
FUNDAMENTAL RESEARCH IN INDUSTRY

Recent scientific advances, especially those in the defense and military equipment fields, have reemphasized the importance of basic research to technological progress in every area of endeavor. Although less spectacular in terms of newspaper headlines, basic research has been a major factor in the technological revolution in farming — making possible the dramatic rise in farm productivity that has contributed vastly to the nation's progress and the living standard of its people.

An example of the contribution of fundamental research to agricultural progress comes from the laboratories of the Du Pont Company. In the early 1930's Du Pont scientists, as part of the company's fundamental research program, began studying the relation of structure of synthetic organic chemicals to biological activity. It was found that one series of halogen compounds had a mild germicidal action, while related compounds had a profound effect on plant growth and, depending on quantities applied, either killed plants or promoted their growth. This discovery was made by Dr. John F. Lontz.

Solution of Farm Problem

What had at first been the search for scientific knowledge now became a potentially important discovery that could be applied to the solution of an important agricultural problem — weeds. Out of this study was born the first modern chemical herbicide — 2,4-D, with the following chemical structure:



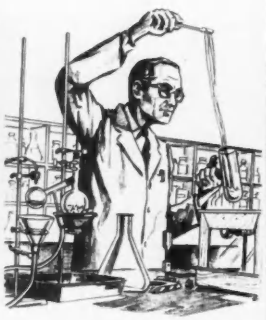
Further experiments were undertaken and new compounds discovered to do a better job. From this evolved a group of urea derivatives, discovered by Dr. Charles W. Todd, that killed plants through an entirely different mechanism. Monuron, one of these urea herbicides, has this structure:

Through the synthesis and testing of more than one thousand compounds, Du Pont researchers determined the effective weed killers of the urea type. Those which are commercially of the greatest importance contain a benzene ring with at least one halogen substituent. The halogen confers the most interesting properties when it is in the meta or para position. They also found that it was necessary to introduce alkyl groups into the urea.

Pioneer in Research

Du Pont has been a pioneer in industrial fundamental research — the seeking after scien-

FUNDAMENTAL RESEARCH begun in 1927 showed that creation of a fiber like nylon was theoretically possible.



LABORATORY DEVELOPMENT bore out theory, produced fiber. Research, development bill amounted to $6 million.

FINANCIAL SUPPORT came from management, which decided to risk additional millions to commercialize nylon.

SERVICE OF SPECIALISTS like plant design experts above made possible scale-up to full production of nylon.

tific knowledge without specific commercial purpose. When Du Pont's formal program was launched 30 years ago, industrial research was confined almost entirely to what many called "practical" applications. In fact, some companies that have engaged in research over long periods, have only recently turned to fundamental research on a significant scale.

With Du Pont, fundamental research has become "a way of life." Even during the business depression of the 1930's, the program was increased. President Lammot du Pont expressed the company's position in 1932, the worst depression year, by saying "it is more important to carry out research than to pay dividends." In 1957, the company spent about $15 million for fundamental research, nearly 20 per cent of its entire research and development budget of $75 million. On the average, industrial expenditures for basic research run at four per cent of the total, according to the National Science Foundation.

Useful Products Developed

Du Pont's ability to continue large-scale basic research is based to a large extent on the fact that the diversity and broad base of its industrial activities make it possible to put into commercial production a significant number of the discoveries made. Perhaps the best illustration is the work on condensation polymers begun when the fundamental research program was launched 30 years ago. This study was the basis for such products as nylon, (see below), "Zytel" nylon resin, "Mylar" polyester film base, "Cronar" polyester photographic film base, and polyurethanes.* The first general-purpose commercial rubber, neoprene, was born in the test tubes of the fundamental research laboratories as a sticky mass with the ability to bounce.

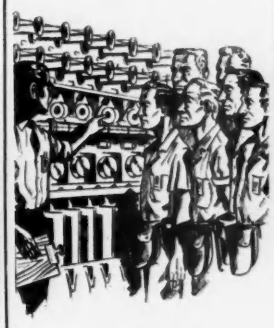
Eighteen Years to Completion

The long-range nature of basic research is shown by the steps that led up to Du Pont's newest plastic product — one which may have major importance when commercial production begins next year. In 1939, work was begun on the study of liquid formaldehyde reaction. After a wartime interruption, the work was resumed and the evidence eventually showed that a new plastic could be developed from formaldehyde. A massive research assault undertaken in 1950 was successful and a plant is now under construction to make the product — "Delrin" acetal resin — 18 years after initial research began.

As in the case of most fundamental research, the overwhelming majority of the projects undertaken do not result in any commercial application. Yet, often there is a significant contribution to the sum total of scientific knowledge, which, in turn, helps advance the ability of science to progress further into the exploration of the nature of our universe.

**Many hundreds of end products have grown from these materials, including apparel, tire cord, bristles, wrapping materials, containers, recording tape, greenhouse films, insulation, shock proofing, photographic films, and molding compounds.*

CONSTRUCTION of plant involved 125 different types of craftsmen, and a peak force of some 1300 workmen.



SKILLED WORK FORCE was built by Du Pont, which began hiring, training long before actual production started.

MARKETING team assigned to nylon had benefit of 19 years' experience selling other man-made textile fibers.

CONSUMER was beneficiary when nylon reached market. By then, Du Pont had $27 million invested in nylon.

newer developments in LAYING HEN NUTRITION

By Hans Fisher*
Department of Poultry Husbandry
Rutgers University

During the past few years considerable progress has been made in investigations designed in the first place to determine more about the nutrition of the hen and not merely to adapt what is already known from broiler studies to the formulation of laying rations.

In this report three aspects will be considered: (1) the protein and amino acids; (2) the problem of fat supplementation; and (3) maintaining hens in cages.

Protein Requirements

The protein requirements of the hen based on practical feeding ingredients such as soybean meal in addition to a cereal such as corn or wheat has been estimated to be in the neighborhood of 15 per cent of the total diet. Recent work at several experiment stations has indicated that this level of protein is fully adequate even when the energy content of the diet is substantially increased through the addition of fat. Here at Rutgers we have, for the second consecutive year, maintained hens on a 15 per cent protein level with high energy diets containing 10 per cent added fat, without observing adverse effects in terms of egg production, mortality, or otherwise.

In other experiments we have varied the protein level between 15 and 30 per cent and have fed these protein levels in combination with levels of fat ranging from zero to as high as 30 per cent. Again, the hens proved remarkably insensitive over such a wide range of fat values. In view of these findings with practical diets, we investigated the protein requirement using a semi-purified diet in which all of the protein came from one source — in this instance, soybean meal. We found that when soybean meal was used, supplemented with a small amount of methionine, excellent production and efficiency could be maintained on a protein level of only 12.2 per cent. British workers have also shown in recent years that levels of protein as low as 12 per cent could support normal egg production.

In an effort to determine more precisely the protein requirement in terms of the building blocks from which proteins are made — namely, the animo acids — a completely synthetic ration was developed in this laboratory to study the animo acid requirements. With the use of this diet together with comparative studies with intact proteins, we have found that soybean meal is probably one of the best protein sources for the hen, deficient only to a slight extent in the sulphur amino acids, cystine or methionine. This deficiency is readily overcome in practical feed formulation by the complementary value of the other protein in the diet, specificially, the cereal proteins.

Fats in the Blood

The problem of fat supplementation for laying rations is considerably more complex than it is in the formulation of broiler rations. In the first place, as already indicated, the hen is not very sensitive with regard to protein-energy ratios. Secondly, the type of fat which is cheaply available to the feed industry, the inedible tallows and greases, bring with them considerations for the hen that are of no importance for the broiler.

It has been shown in studies with many species of animals, including man, and in our laboratory with the hen, that the addition of tallow to the diet may change the manner in which the animal can utilize fat as manifested by the kind of fats found in the blood. Of particular concern has been the level of blood cholesterol and its possible relationship to arteriosclerosis and diseases of the heart. Since the stress of egg production involves a large turnover of fat on the part of the hen,

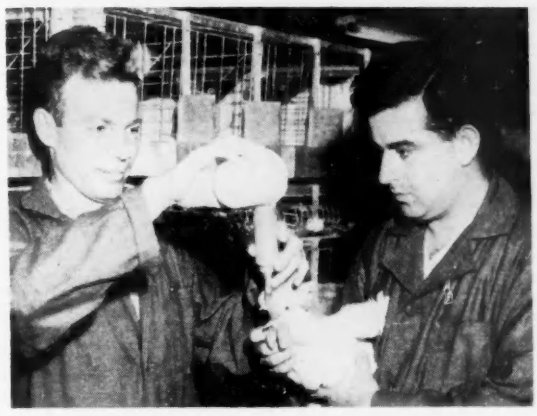
*Excerpts from an article in Poultry Comment, Vol. 14, No. 2, Fall, 1957, published by E. I. du Pont de Nemours & Company (Inc.), Grasselli Chemicals Department.

the question arises whether the productive life of a hen may not be adversely affected by the inclusion of large amounts of such animal fats when fed in the ration over a one- or two-year period. Even when these considerations are overlooked, the question of an economic advantage from the addition of fat remains problematical depending to a considerable degree upon the environmental temperature conditions to which the laying flock will be subjected. Thus, experiments at Cornell have indicated improvements in feed utilization during the winter months whereas Washington State and New Jersey have been unable to show similar improvements undoubtedly due to the more temperate winter climate in the latter two regions.

Problems with Caged Layers

Another phase of fat supplementation which is still in the experimental stage is of interest. In view of the large quantities of fat which are deposited in the egg yolk and whereby the egg provides one of the major sources of fat in the human diet, the question of controlling the type of fat which ultimately will be consumed by the human population may be of great importance in connection with the heart and arteriosclerotic diseases already referred to above. We have been able to induce changes in the type of fat laid down, whose beneficial value, if any, is being investigated at the present time.

The maintenance of laying hens in cages has become an important aspect of the egg producing industry. Confronting this segment of the industry are the problems of activity in the small area given to the hen in a cage and a major, seemingly nutritional, problem known as cage fatigue. In our work at Rutgers we have made several interesting observations on many phases of cage production. In our experience, cage fatigue is definitely related to the vitamin D and calcium levels in the diet. Upon increasing the dietary level of calcium to at least 2.5 per cent, we have been able to reduce, if not entirely overcome, the incidence of cage fatigue. In one group of 100 hens which have been in cages continuously for 10 months we have not observed a single case of this syndrome since the dietary calcium level was adjusted.



FORCE FEEDING a laying hen with purified diet containing free amino acids is employed in laboratory experiment on nutrition.

Exercise is Important

The importance of exercise can be illustrated by the observation that cage hens will be much fatter at the end of a laying season than floor-kept birds, that the incidence of so-called liver disease will be greater and, in restricted feeding trials, we have observed that caged hens on a high energy but non-fat supplemented laying ration will continuously overeat to the extent of 10 - 15 per cent in excess of their requirements for body weight maintenance and proper egg production. In fact, it has been our observation that hens thus restricted will usually lay at a better rate than non-restricted hens. As a consequence of these observations, we are using relatively low energy cage rations in which considerable amounts of fibrous ingredients such as oats and milling by-products are used.

Correction:

CHEMICAL KILLS CABBAGE CLUBROOT

VPM soil fumigant, applied 14 days before transplanting, will control clubroot in cabbage and cauliflower. VPM should not be applied after transplanting as stated in the Fall, 1957 issue of the Agricultural News Letter. One quart of the chemical in 15 gallons of water is applied per 100 square feet, followed immediately with another 5 to 10 gallons of water. This treatment will also control weeds in the application area.

LYSINE SUPPLEMENTATION OF CEREAL FOODS

Bread, normally a low protein-value food, can easily be given a tissue-building value approaching that of meat and milk by supplementing it with a small amount of the essential amino acid lysine. This advance in the science of human nutrition is expected to play an important part in solving protein deficiency problems in the United States and other parts of the world.

Almost all cereal grains are deficient in lysine, some also in other amino acids. Wheat, which is grown on more of the world's acreage than any other crop, is deficient chiefly in lysine. By supplementing wheat foods like bread with lysine, they are converted into superior protein foods.

Lysine is one of the essential amino acids, the building blocks needed for the formation of tissue protein. Since these amino acids cannot be synthesized in the human body, they must be supplied ready-made in food. All eight of the essential amino acids needed by humans must be present in the proper proportions to form tissue protein. If only one essential amino acid is short in food, much of the rest is converted to energy or fat, rather than used for tissue synthesis. Animal proteins, as in meat, milk, fish and eggs, contain lysine and other essential amino acids in good balance and are therefore, efficiently utilized for growth and repair of body tissue.

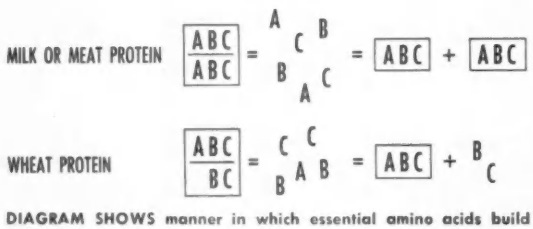


DIAGRAM SHOWS manner in which essential amino acids build body tissue. Missing amino acid prevents building of tissue.

In terms of quantity of protein, three slices of white bread are equal to one egg. But bread protein ordinarily has only one-third the value of egg's high-quality protein. Because of this, it takes nine slices of ordinary bread to provide the protein equivalent of an egg. Five slices of lysine-supplemented bread, however, are equal in protein value to one egg. The value of special lysine-supplemented protein-formula breads can be even higher so that 3½ slices are equal to one egg. Such breads are made with added milk and soy protein, as well as lysine.

It is now commercially practicable for bakers to produce bread supplemented with lysine as a result of Du Pont's long research program to produce synthetically this naturally occurring nutrient. There is no change in the taste and bread texture — or in baking techniques. Certain protein-formula specialty breads in the United States are already lysine-supplemented.

May Become Practice

Lysine supplementation may become as common a practice in the future as vitamin B addition is today. A study at Purdue University showed that lysine supplementation substantially added to the nutritive value of white bread which already contained milk solids. In fact, breads containing four times the amount of milk solids usually used commercially can still be significantly improved in protein value by adding small amounts of lysine.

Bread supplemented with lysine would not only raise the high-quality protein intake of consumers generally, but would help solve many specialized problems. For example, an important problem in convalescence is the high incidence of hypoproteineosis (protein malnutrition) which may result in slow healing of wounds or fractures, infections, weight loss, or failure to regain strength.

Efforts to overcome malnutrition may be hindered by insufficient intake by patients of such foods as eggs, meat and fish. Ordinary bread, a good source of dietary essentials, is generally well accepted. With lysine supplementation, it can add significantly to the high-quality protein intake.

Improved Recovery Rate

Experience has also shown improvements in disease recovery rates in adolescents with a high-protein diet. A study at the Henry Ford Hospital on 1,100 children demonstrated a clear relationship between reactivation of tuberculosis and diet: "There is always a direct

GROWTH RATE of rats fed bread diet is improved through addition of small quantities of essential amino acid, lysine.*

relation between healing and adequate protein intake." Children suffering from rheumatic fever showed less heart damage with a high-protein intake.

A report on a 25-year study of the effects of protein on growth between the ages of one and 10 from the University of Iowa states that generous amounts of protein — at least half of it high quality — "is the cheapest nutritional insurance we can buy for our children." Children, like adolescents, are heavy consumers of bread, so that better bread can make an important contribution to their intake of high-quality protein.

Extreme Shortages Exist

Although indications are that lysine-supplemented bread will play an increasingly important role in the American diet, it also may help to solve some of the world's protein malnutrition problems. Only 18 of 58 countries studied reached the reasonably adequate level of 30 grams of animal protein intake per day. As pointed out in the USDA "Yearbook of Agriculture" for 1950-1951, most of the world's population depends directly on the annual harvest of cereal grains for its basic food staples and major parts of the world's population subsist mainly on lysine-deficient cereals — wheat, corn and rice.

Extreme shortages of protein are common in Asia, Africa, Central and So.th America, and parts of Europe. Widespread hypoproteineosis is visible in retarded growth, high child mortality, inferior adult size and strength, and low resistance to tuberculosis and other infections.

It is generally agreed that the situation in the areas suffering from protein deficiency will continue to deteriorate because of the constantly rising population. Some food shortages — strange as that might sound in an era of unmanageable surpluses — may well be a U. S. problem in the foreseeable future. This is especially so in high-quality meat proteins since it requires about 10 pounds of grain to produce one pound of meat.† Thus, the proportion of cereal foods, especially bread, may increase in the U. S. diet as the population rises.

Farming Begins Civilization

Civilization began with agriculture. Population grew with the ability of agriculture to support it. Before the invention of farming about 6000 B. C., world population was probably less than 20 million. It passed the billion mark in mid-18th Century. Between 1850 and 1950, it doubled to 2.5 billion and could reach six billion by 2000, according to the Population Reference Bureau. Each day, there are 100,000 more mouths to feed on the face of the globe. In the U. S., population doubled between 1900 and 1950. It grew three million last year and the present 172 million will be at some 300 million by 1993.

Perhaps the survival of civilization will depend upon the extent to which the partnership between agriculture and chemistry can increase and enrich the world's food supply.

**From H. R. Rosenberg and E. I. Rokdenburg. Archives of Biochemistry and Biophysics*, 37:461 (1952).

†*"As it takes about 10 pounds of grain to produce one pound of meat, the load on grain production facilities to provide feed for livestock, which gives back only about one-tenth in food, becomes more and more prohibitive." The Yearbook of Agriculture*, 1950-1951, *p.* 335.

SUN-POWERED FENCE CHARGER

Energy from the sun is being harnessed to operate an electric fence charger at Purdue University. Silicon solar cells, located in a frame on top of a conventional fence charger, collect radiant energy from the sun and convert it directly to electrical energy. Cows do not go through the fence when the sun is not shining because the solar cells also charge nickel-cadmium storage cells inside the fence charger. The solar-powered fence charger could operate in remote areas without the need for replacing batteries or connection to power lines. — U. S. DEPT. OF AGRICULTURE.

new PRODUCTS AND APPLICATIONS

A new nylon resin, for molding of plastics combining mechanical toughness with outstanding resistance to heat and weathering, looks promising for use in agricultural machinery, automotive, and electrical components. "Zytel" 105 nylon resin, a jet black product which is readily injection molded and extruded, is specially compounded with heat and light stabilizers. These characteristics, plus its abrasion resistance and low water absorption, indicate that this resin will far outlive any other nylon in these applications.

* * * * *

A light-weight dinghy usable on the farm pond or lake is made unsinkable through the use of urethane foam. It is constructed of a double hull of fiberglass filled with urethane foam for buoyancy, increased structural strength, and improved maneuverability. (Du Pont makes "Hylene" organic isocyanates, a principal raw material in foam making.) The boat floats even if the hull is punctured. Its 53-pound weight and 7½ foot length make it easy to carry, or transport on car top or in a small truck ("Bluboy" boats are made by Riverside Plastics Co., Mystic, Conn.).

* * * * *

A garden hose sprayer offered by Du Pont for use particularly with liquid garden chemicals is versatile enough to spray trees 30 feet high and still do a good job at close range on ornamentals and turf. Its versatility results from a deflector adjustment and a choice of two nozzles. The two-nozzle design permits using the sprayer for chemicals such as 2,4-D lawn weed killer without risk of contaminating sprays to be applied to ornamentals. Chemicals are mixed in a concentrated solution which flows from the sprayer jar into the water stream at a constant rate.

* * * * *

Snap-on type insulation can be installed on hot or cold pipes in dairies, homes, and other farm facilities in any shape or size with urethane foam. These foams have excellent insulating properties and surpass other insulating materials in their strength and light weight. They can be formed to a snug fit and easily cut with a pair of shears or sharp knife. The light weight and high tensile strength permit a more economical fastening system and considerable reduction in materials handling cost, while the tensile strength eliminates the use of anchors and bands.

New economies have been established for open-top trucks and trailers through the use of nylon tarpaulins coated with vinyl or neoprene. The light weight of these tarps allows one man to mount or remove the covering instead of the usual two or three men. Durability and ease of repair have cut costs considerably. A newly developed cementing technique permits on-the-spot tarp repairs. Water-proofness has increased fleet efficiency by eliminating the need to pamper water-sensitive cargoes. One firm reported an 80 per cent cut in claims for damaged cargo.

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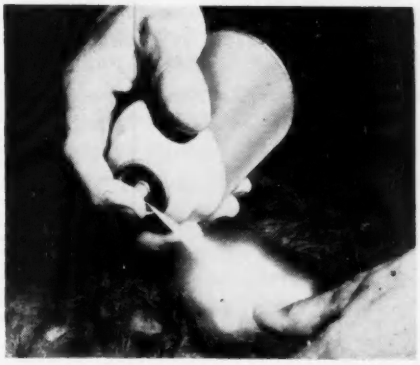


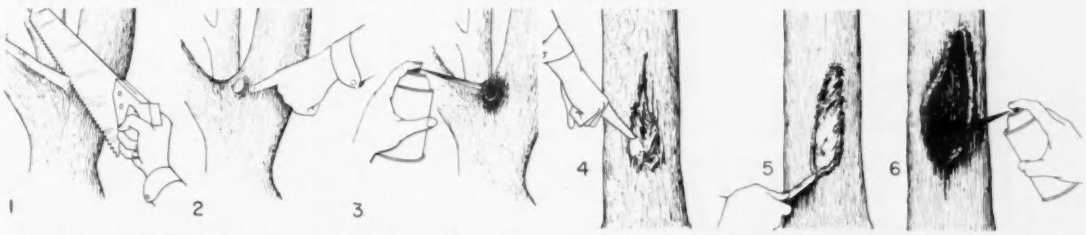
Livestock identification problems at breeding and sorting time may be eased by an aerosol fleece-marking formulation developed by Du Pont and offered free to interested packagers. Harmless to animals, the dye mark produced by the formulation is stable to water but is removed easily by normal scouring processes. It provides a pencil-like jet of dye which, at a distance of 12 inches from the animal, makes an indelible mark about one inch in diameter. It eliminates the job of mixing dye solutions in the field for application by brushing or daubing.

* * * * *

U. S. D. A. tests indicate a new transparent plastic curtain may prove more efficient than curtains previously used for refrigerated delivery trucks. Made of tough "Mylar" polyester film, reinforced at the edges with neoprene-coated nylon, the weighted curtain admits light but restricts passage of air and moisture at delivery stops — a major warm-weather problem. The curtain remains flexible under freezing conditions. Tests showed frozen foods stayed 3.2° colder and inside temperature remained 7.2° colder than without the curtains. Suggested uses include local delivery of meats, frozen foods, milk, ice cream, and produce.

* * * * *

The gardener need no longer look like a "tar baby" after repairing tree wounds and pruning cuts if he uses a new aerosol spray tree-wound dressing introduced by Du Pont. The user can safely wear a white shirt without even rolling up his sleeves for the material sets quickly to form a smooth black seal against moisture and decay. Packaged in a 12-ounce push-button container and pressurized with "Freon" propellent, the new material is designed for rapid and easy treatment of wounds to trees and ornamental shrubs such as those caused by accidents from lawn-mower collisions and close bull-dozing.



1. Small branches may be removed by making a single cut, flush with trunk of tree.
2. Open pruning wounds can be protected with Du Pont Tree Wound Dressing while they heal.
3. Aerosol application of dressing is neat, provides seal against moisture and decay.
4. Tree-trunk injury should be repaired before decay and disease cause further damage.
5. Loose bark should be cut away and edges of injury smoothed, leaving channel for drainage.
6. Tree Wound Dressing covers the injury, giving nature better chance to heal damage.

Despite Rising Costs

Chemical Industry Holds Price Line

With farmers already buying about 60 per cent of the items they require for agricultural production, plus a substantial proportion of the things they and their families consume, the cost of purchased products is a strong determinant in farm profits and in the price of agricultural products. An important factor in keeping the cost of many of these purchases low has been the relative stability of prices of products made by the chemical industry.

Not only do U. S. farms consume about 23 million tons of fertilizer and over 500 million pounds of pesticides — most of it produced by the chemical industry — but chemical products are found in hundreds of other articles they require. The refrigerant in the freezer or refrigerator is made in a chemical plant. So are the synthetic rubber fuel lines in the tractor, detergent in the motor oil, nylon cord in truck tires, disinfectants for milk tanks, preservatives for canning, anti-freeze, and sponges for cleaning.

Chemical Prices Lower

Thus, the relative stability of chemical and allied product prices is of particular significance to the farm economy. Today, the wholesale price index for chemical products, as published by the Labor Department, is lower than that of any other major industrial product, except textiles and leathers. Using the period 1947 to 1949 as a base, the Department reports a price index ranging from about 95 (for textiles) to over 152 (for metals). Chemicals are up but 10 per cent; fuel and power, 16; paper products, 130; machinery and motive products, 147; furniture and household durables, 123; while the average of all non-farm commodities is up by 26 per cent.

Product is Improved

Fertilizer and fertilizer products, which constitute a major farm cost, have risen only six per cent over the 1947-1949 level and only one per cent since 1949, the lowest rise of any purchased production item that is not mainly farm-produced.* Despite this price stability, there has been a very substantial upgrading of the product and, according to the Agriculture Department, "the newer fertilizers contain more plant nutrients per ton than the older fertilizers . . . From 1950 to 1955, sales of 2-12-6 fertilizers, for example, declined from about 1,356,000 tons to about 44,000 tons. During the same period, combined sales of 4-16-16, 12-12-12, and 5-20-20 fertilizers increased from about 27,000 to about 1,574,000 tons."

By contrast, the cost of taxes per acre, as reported by the Department of Agriculture, has gone up over 60 per cent, with another five per cent predicted for 1958. Motor supplies and farm supplies are up 22 per cent; motor vehicles, 39 per cent; and farm machinery, 49 per cent; while building and fencing materials have risen 32 per cent.

Costs Are Up

The experience of the Du Pont Company illustrates one way in which chemical prices have stayed within narrow limits. The company's sales price index is less than six per cent over the 1947-49 base, and only slightly over one per cent above 1949 — coincidentally, the same increases as those in fertilizer prices.

On the other hand, Du Pont has experienced substantial increases in other costs, as has the agricultural sector of the economy. Wages are up 65 per cent over the base period (compared to a 31 per cent rise in farm wage rates), purchased raw materials are up eight per cent, and taxes rose over 30 per cent per sales dollar.

The ability of Du Pont to keep its prices relatively lower than the general price level, is due largely to the rising productivity brought on by improved methods and the investment in better equipment — the same factors that have brought such spectacular increases in farm productivity.

**Du Pont recently announced a reduction of approximately 10 per cent in the delivered price of "Uramite" fertilizer compound to distributors.*

Hybrid Sorghums Boost Dry Area Feed Supplies

Last year, Kansas raised more bushels of sorghums than of the staple grain which made the "Wheat State" famous. In varying proportions such things are happening in many parts of the U. S., especially in dry areas where the newly-developed hybrids seem to "thrive on drought and transform marginal soil into profit-boosting acreage." The Agriculture Department reports the 1957 sorghum grain crop was over twice the 1955 record.

Member of Grass Family

Sorghums represent one of the oldest of man's agricultural crops. Originating in Africa and China,they are members of the grass family, like corn, wheat, and other grains. Among the varieties are sweet sorghums, raised for syrup; broom corn; and sorghums raised for grain, hay, or silage, such as Kaffir corn, milo maize, Jerusalem corn, and durra. Although broom corn cultivation in the U. S. goes back to the 18th century, sorghums did not have appreciable cultivation until the Civil War, when sweet sorghum was widely used to make up for the sugar shortage.

Sweet sorghum production continued to increase until some 30 years ago, but has declined since that time. Some sweet varieties can be used for silage, pasture, or hay. As much as 15 tons of sorghum hay per acre can be produced under conditions that would be unfavorable for most hay crops, if they could survive at all.

Withstand Heat and Drought

Grain sorghums are now the principal members of their family in U. S. agriculture. Their ability to withstand heat and drought make them suitable for cultivation in areas where feed grains are badly needed. Introduction of hybrid varieties promises to go far in increasing production for these areas.

The successful hybridization of corn, which provided a major stimulus to American agriculture, is now being reenacted by sorghum. New hybrid varieties are being introduced rapidly and the practical experience of farmers will eventually demonstrate the extent to which they can be profitably adopted to large-scale agriculture.

Breeders are working on the development of certain general characteristics which will improve yields and which will make the crop more adaptable to various growing conditions and mechanical harvesting. A high degree of seedling vigor makes for earlier assured stands, but the final judgment must be made on the contents of the heads — in terms of bushels of high-quality grain per acre.

Susceptible to Seed Diseases

Size of head, as well as size of the grain itself, is an important factor in both yield and quality. Position of the head in relation to the rest of the plant is also an important consideration in harvestability and quality. Growers prefer the heads to be loose enough so that the grain will dry out well without shattering at harvest time. The substantial increase in sorghum acreage in recent years would indicate that these goals are being achieved.

One of the problems in sorghum cultivation is the susceptibility of seed to such diseases as seed rot and loose and covered kernel smuts. Thiram and mercurial seed disinfectants provide good control of seed diseases. Du Pont's "Ceresan" (mercurial) and "Arasan" (thiram) seed disinfectants have been used for this purpose. "Delsan" A-D seed protectant, a combination insecticide and fungicide, has been giving better stands than the fungicide treatment alone in tests in Kansas, Nebraska, and Texas.

No Risk of Injury

The fungicide in "Delsan" A-D is thiram (tetramethylthiuramdisulfide) and has been used on hybrid corn for more than a decade. For sorghum, it is more effective as a fungicide protectant than mercurial compounds commonly used. It will control kernel smuts without risk of seed injury, even in warm storage. The other active ingredient is dieldrin insecticide, which also protects the seed and germinating seedlings from attacks by soil insects, including the seed corn maggot and the Kaffir ant. These insects apparently play a more important role than previously realized, since addition of the insecticide improves stands even where insect damage was not apparent.

Modern Packaging Boosts Farm Income Too

By Albert S. Allen
Film Department
E. I. du Pont de Nemours & Co. (Inc.)

Modern methods of packaging food — widely celebrated for the benefits they offer distributors, storekeepers, and housewives — provide significant economic gains to farmers as well. By upgrading produce or eliminating waste, better packaging insures a greater return to the grower on the consumer's food dollar. And by making possible a greater variety of appetizing foods, it has helped earn for growers and producers a larger share of the income dollar in an age when more and more good things compete for consumer favor.

Many noteworthy developments in recent years have contributed to better food packaging. Deep-freezing brought to market foods that are fresher, and delicacies once limited to certain regions or seasons. Emphasis on convenience - size packages made available many foods in single servings or for single meals without waste. Better materials — in particular, transparent films such as cellophane and polyethylene — make every package a miniature showcase. At the same time, they keep food fresh, clean, and dry or moist, whichever is desired.

Savings Through Elimination of Waste

Since there is a limit to what a housewife will pay for food, prices paid to grocers have long reflected the $200-million annual loss from spoilage or manhandling between farm and market, and the difficulty in selling unpopular sizes. In the wooden-basket era now ending, 50 per cent of all tomatoes grown never reached the table. About 17 per cent of all grapes rolled off their bunches; 10 per cent of all peaches and pears were mauled in the market; and 12 per cent of all lettuce leaves wilted and were discarded before weighing for final purchase. Root vegetables carried to market a profitless burden of tops and leaves. Cracked cabbages were thrown aside, and small — though perfect — apples and oranges went to dump heaps.

OLD-TIME WASTE in marketing produce has been greatly reduced by modern packaging methods, largely through use of transparent films. Both housewives and growers suffered financial loss when up to 50 per cent of vegetable and fruit crops ended up on rubbish heaps.

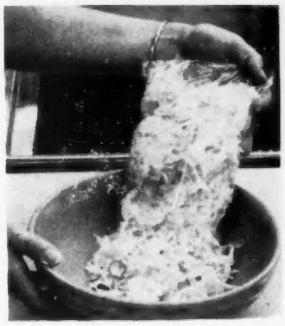
Now plastic bags and wraps are cutting waste by as much as one half. Cracked cabbages are packaged as coleslaw, or shredded with other perfectly good "seconds" to make salad mixes. Lettuce heads stay whole and moist, and pears remain unbruised and unpinched. Small but good quality fruits once sold at a loss are now quickly picked up by shoppers at premium prices, when three to six are tray-wrapped, or five-pound lots are put up in transparent bags. Grapes clustered in boxes with cellophane windows reach the table with every grape still on the stem. Carrots are shipped in polyethylene without tops or ice to keep tops green, an "extra" that once doubled freight charges.

These savings have brought higher prices for growers, or have sustained prices despite huge increases in the volume sent to market.

Food Variety Tempts Shoppers

Better packaging materials and methods have also enriched the diet,

adding to farm income. Turkeys and cranberries, for example, are no longer limited to winter holidays; improved marketing has helped raise turkey consumption from 507 million pounds in 1947 to 818 million pounds in 1955. Fresh fruits and vegetables no longer disappear from the market with the first frost. Even produce commonly canned tastes better — and sells in greater volume — when fresh frozen. The consumption of peas, corn and string beans, for example, has doubled since the familiar frozen food package of cellophane overwrap on a paper carton appeared on the market over 10 years ago. Out of season sales of strawberries grew from 109 million pounds in 1947 to 273 million pounds in 1955 — in fact, more frozen strawberries are now sold in a year than fresh ones.



The Trend to Prepared Foods

The great popularity of partly prepared foods has made obsolete the meal which took the housewife several hours to prepare. Cake mixes and salad mixes, pre-cooked meats and sauces, and complete meals that need only warming reduce time and labor in the kitchen by two-thirds, and encourage her to serve specialty dishes that once would have taken hours to prepare.

This use of prepared foods enables the housewife to spend more time on other duties or in employment outside the home. Nearly 30 per cent of all married women now work at paying jobs, in addition to their home responsibilities. Once, women who did double duty could offer their families little more in the way of nourishment than the very limited selection of food available in a few tin cans. Now, the variety of deep frozen foods and special mixes makes possible wholesome meals for the family of the working wife. At the same time, it provides greater returns to the farmer. For invariably the better foods make use of more profitable grains, meat and produce than the limited choice of beans, hash and stews available to the busy wife until 10 years ago.

Packaging Trends Reflect Demand

One fact is certain: The great movement forward to better foods preserved in more attractive, more sanitary, and more convenient packages is a trend encouraged by all the massive buying power of American housewives. Farm producers, as well as distributors, who take advantage of new packaging methods will benefit the most in the months and years ahead. Growers who raise quality foods, for example, will find that transparent, attractively printed film wrappings give their produce an edge in the market place. Proper labeling, so easy now with the modern equipment for wrapping with printed films, identifies quality produce so firmly in the housewife's mind that she learns to look for select brands whenever she shops.

Modern packaging methods have developed in answer to the changing marketing needs of a dynamic society. The new plastic films, while no more expensive for most uses than older packaging materials, combine with new processes to provide an ever increasing variety of delectable foods, easily and quickly prepared. These improvements help to explain why 26 per cent of the average family's income is still being spent for food. Were housewives still using the shopping lists of the late thirties, their purchases would require no more than 18 per cent of today's family budget. Instead, new packaging and processing methods have helped to keep farm incomes in line with the general economy, and well ahead of the levels of two decades ago.

Booklet Shows Life in a Corporation

The large industrial corporation is of great interest to the public. This is evident from the number of motion pictures, television shows, Broadway productions, novels, and scholarly studies that have dealt with corporate life.

"The Story of Life in a Large Corporation," the latest booklet in the "This is Du Pont" series, tries to give a picture of what it is like to be connected with one U. S. corporation—as an employee, an owner, a customer, a neighbor. A copy may be obtained from Public Relations Department, Du Pont Company, Wilmington 98, Del.

DIRECT SEEDING OF PINE

Discovery of a bird and rodent repellent which can be easily applied to longleaf pine seeds before sowing is making the direct seeding of trees practical and inexpensive. The repellent, composed of tetramethylthiuramdisulphide,* is not harmful to birds or animals in the amounts used and does not retard germination of the seed. Although it irritates the eyes, nose, and throat of humans slightly, it is safe to use, according to studies made by the Alexandria (La.) Research Center of the Forest Service and the U. S. Fish and Wildlife Service.

Cheapest Way to Plant

Successful use of this repellent on longleaf pine seeds has prompted tests with other types of southern pine seeds. It is also being tried on the seeds of pines in other parts of the country. Direct sowing of tree seeds is the cheapest way to plant. Foresters, however, still advocate setting out seedlings because it is a simpler procedure for most people and more predictable. But seeding is becoming more fool-proof and in another few years should be more generally accepted. Seeding costs about $8.50 per acre compared to $12 per acre for planting seedlings. Under certain conditions, the sowing of seeds is the best method for planting, as for instance, in areas hard to get into because of heavy brush or fallen trees.

The seeds should be coated with a repellent of one-half tetramethylthiuramdisulphide and one-half inert ingredients. To make the repellent adhere, the seeds are placed in a wire basket and dipped in a steel drum of asphalt emulsion, a roofing compound, diluted with water at the rate of one part asphalt to three parts water. After the seeds drain they are placed in another steel drum containing about one pound of the fifty per cent thiuram mixture to six pounds of seed. — U. S. DEPARTMENT OF AGRICULTURE.

Du Pont manufactures thiram seed disinfectant and protectant under the trademark, "Arasan."

RATS FED IRRADIATED MEAT SHOW NORMAL GROWTH

Rats fed for two years with irradiation-preserved meat appear as healthy as rats fed a non-irradiated ration.

The ration was made up of kidney, heart, brain, and tripe that was ground, mixed, and sealed in cans. Half the cans were subjected to high intensity gamma irradiation, the other half were frozen.

Before feeding, the same amounts of vitamins, proteins, salts, and potato starch were added to both groups. Rats fed were of a single strain with litter mates on irradiation-treated and untreated rations. During the experiment, rats on the treated diet weighed, grew, and produced as many pups as those on the non-irradiated diet. Four generations were tested.

Although rats are one of the best animals for such experiments (their nutritional requirements, digestive system, and growth rate are similar to humans), more testing is necessary before irradiation-preserved foods can be considered suitable for human food. — OREGON STATE COLLEGE.

FEED DIFFERENCES FOR LAYING HENS

Results from recent experiments with White Leghorn and New Hampshire (meat strain) hens indicate that the protein requirement differs for light and heavy type birds. According to these results, protein requirement increases as egg production increases. The production rate for the New Hampshire strain was never over 65 per cent any time during the trials and the calorie-protein ratio of 72:1 was as satisfactory as more narrow ratios. These results indicate that cost can be lowered by regulating the protein level according to the production rate for light and heavy type birds. — AGRICULTURAL EXPERIMENT STATION, MISSISSIPPI STATE COLLEGE.

ROSE BLACK SPOT CONTROL

Last year, it was again possible to get good control of black spot on roses, even when test plots were adjacent to untreated checks. Using the Floradora variety, which is very susceptible to black spot, tests showed the best treatment to be maneb spray or a spray formulation containing maneb. Six applications of sulfur-copper dust were used over the entire area until June 1. With hot weather, 36 test plots were arranged for application of various chemicals in 4 randomized replicates. The treatments were used at weekly intervals as far as possible between June 12 and September 25.

Black spot was scarce through early June but became noticeable in the control plots on June 27. On September 24, the check areas (untreated after June 1) showed an estimated 61 per cent of leaflets with black spot, compared to two per cent for "Manzate"* maneb fungicide at ¾ lb. per 50 gallons and one per cent for "Manzate" plus "Thylate"* thiram fungicide, at ¾ lb. and 1 lb. per 50 gallons.

The bushes were dug and weighed on December 10, 1957, and those in plots sprayed with "Manzate" averaged 9.10 lbs. per 10 bushes or 42 per cent heavier than the checks which averaged 6.39 lbs. per 10 bushes. Those treated with "Manzate" plus "Thylate" averaged 9.50 lbs. or 49 per cent heavier than the checks. These two "Manzate" treatments did not differ significantly (a difference of 0.58 lbs., or 9 per cent, was necessary for significance with 2,770 bushes weighed in the experiment). Sprays with "Manzate" had better residual action and more leaves were retained to date of digging than with the other treatments — TEXAS ROSE RESEARCH FOUNDATION, INC.

**DuPont trademark.*

NITROGEN ADDITION IMPROVES RANGE

Application of nitrogen fertilizer can lead to rapid range improvement, leading to longer grazing periods and better distribution of livestock over grazing areas, according to tests at the Department of Agriculture Northern Great Plains Field Station. Even though the price of hay might not make nitrogen application profitable, added weight gains of grazed livestock may more than balance the cost of fertilizer.

TESTS SHOW "SESOXANE" SYNERGISTIC FOR METHOXYCHLOR

By H. E. Fairchild, Research Entomologist
Grasselli Chemicals Department
E. I. du Pont de Nemours & Co. (Inc.)

Laboratory evidence shows a synergist effective with pyrethrins also improves the insecticidal efficiency of methoxychlor. Methoxychlor was synergized at various rates with "Sesoxane", the trade name for 2-(2-ethoxyethoxy) ethyl 3,4-methylene-dioxyphenyl acetal of acetaldehyde. Experimental applications provided excellent kill of German roaches for which methoxychlor alone has not been considered effective, and substantially improved kill of the Roberds strain of house flies which is resistant to chlorinated hydrocarbons. In addition, the synergist improved methoxychlor kill of black carpet beetles, confused flour beetles, and granary weevils.

All the treatments reported were applied as contact sprays of acetone solutions, and conclusions were based on per cent kill in a 24-hour period. For example, in one test, a formulation containing one per cent "Sesoxane" and two per cent methoxychlor gave 98.3 per cent kill of German roaches in 24 hours, compared with 1.7 per cent kill for a one per cent solution of "Sesoxane" alone and 13.3 per cent for a two per cent methoxychlor solution.

Very Low Toxicity

If this laboratory work with contact sprays is confirmed for residual effectiveness, and developed commercially, it means a substantial advancement in combining activity against both flying and crawling insects in one formulation for household use. Both methoxychlor and "Sesoxane" have an extremely low toxicity to men and animals.

Methoxychlor is an analog of DDT which was introduced commercially as a residual insecticide by the Du Pont Company over a decade ago. It has been widely used in agricultural and household insecticide formulations. "Sesoxane" is chemically related to synergistic compounds in sesame oil, and "Sesoxane" itself has been tried successfully as a synergist for pyrethrins. The compound was discovered by Dr. Morton Beroza of the U. S. Department of Agriculture.*

**"Sesoxane" is manufactured by Shulton, Inc., Clifton, N. J.*

USDA TESTS COATED NYLON COVERS FOR HORIZONTAL SILOS

Excellent wear life has been shown by two neoprene-coated nylon covers used for silage protection in horizontal silo bunkers at the Department of Agriculture's research center, Beltsville, Md. The nylon covers have shown superior wear life in comparison with other materials, and no measurable loss in strength.

Bunkers were 14 to 16 feet wide; eight high, and 66 long, with sides of matched lumber lined with rolled asphalt roofing and floors of concrete. Stacks were on the ground over well-drained sites. Silage was packed by tractors during the filling period.

Edges were weighted with railroad ties, and the central portion with a two-to-three-inch layer of sawdust. Top spoilage losses were reduced to two pounds per square foot. Forage was harvested in May, and the silos opened for feeding in December. Silage preservation was excellent, almost 90 per cent of the stored dry matter being fed. Spoilage was reduced to an almost negligible amount — averaging 0.4 pound per square foot.

Prevent Spoilage

According to the Department's C. H. Gordon and J. R. McCalmont, "The distinctly lower initial cost per ton of storage capacity and the possibilities of fully mechanized filling and mechanical feeding or self-feeding of the silage have contributed to the increased popularity of horizontal silos.

"The results of these experiments have demonstrated that several type materials are satisfactory for preventing spoilage associated with exposure to air. Films supported by nylon, which are now entering the third year of use, are much more durable and less subject to accidental injury in handling. The useful life of unsupported films will depend to a large extent on the care given them."

NEOPRENE-COATED nylon cover protects silage in U.S.D.A. test.

SEED TREATMENT TO PROTECT OATS FROM VICTORIA BLIGHT

The severe damage which Helminthosporium blights, particularly Victoria blight, spread across southern oat fields last winter has emphasized the great potential increase in stands and yields from proper control of seed infection. Experts have long recommended that winter oat seed should be cleaned and treated with a mercurial disinfectant* for control of smut, root rot, and seedling blights regardless of whether or not the variety is resistant to some disease strains.

Susceptibility Introduced

Victoria blight had been present on timothy and several other grasses for some years; oat varieties susceptible to rust or smut apparently had been resistant to it. With the breeding of rust-resistant, highly productive Victoria strains, it appeared that susceptibility to **Helminthosporium Victoriae** had been introduced.

Victoria blight affects root system, crown, and foliage, and may kill or seriously weaken oat plants at any age. It is recognized by wine-red stripes along the margins of leaves when plants are young, by lodging of headed plants, and by darkening of the nodes due to accumulation of black fungus spores. Roots may be destroyed completely. High temperature and rainfall aid the disease development and together may reduce the stand to the extent that reseeding may be necessary. Such losses have often occurred in the South when farmers made early seedlings of untreated seed for early grazing. Instead, grazing was delayed because of the necessity for replanting.

Increased Production

It has been estimated that 70 acres of oats planted with treated seed can produce as much green feed as 100 acres of untreated. Research evidence and grower experience show an average 30 per cent increase in stands of treated oats compared to similar seed untreated. The range is 5 to 84 per cent.

Furthermore, data developed by the Georgia Crop Improvement Association show that in one test treated oat seed yielded 101 bushels to the acre, compared to 69.3 from untreated — a difference of 31.7 bushels to the acre. Increases may range from 5 to 130 per cent.

*"*Ceresan*" *mercurial seed disinfectants are manufactured by Du Pont.*

Farmers Ask About . . . .

Q: What is the farmer's major resource problem?

A: Water, according to Ervin L. Peterson, Assistant Secretary of Agriculture, U. S. water use is estimated to double in less than 25 years.

* * * * *

Q: What portion of U. S. consumption is represented by the estimated 35 million eggs to be used for making Asian flu vaccine?

A: On the basis of U. S. per capita consumption, it would supply New York City for only three days.

* * * * *

Q: What is the ratio of farm debt to assets?

A: Only $11 in debt for each $100 of assets. Total assets are at an all time high, having increased $8.6 billion in the past year.

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Q: Can apple pomace be used for cattle feed?

A: Yes, beef cattle have been wintered on pomace at the Virginia Experimental Station.

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Q: Do citrus trees become immune to root fungi?

A. No, although young trees are destroyed at greater frequency than mature ones.

* * * * *

Q: What is spent by the average American for food today?

A: The 1956 per capita expenditure of $419 per year, compared to $336 in 1950, reflects a 44 per cent increase in personal income.

* * * * *

Q: How much money does it take to start a farm?

A: An average of $8000 or more.

* * * * *

Q: Does automatic watering improve egg production?

A: It does, according to a report from the Louisiana Extension Service. A 300-hen flock produced 5100 more eggs, bringing a $127 profit increase.

* * * * *

Q: How much water should be provided for livestock?

A. Thirty-five gallons per day for each milking cow, 12 per beef cow, dry cow or horse, 4 per hog, 2 per sheep and 4 for each 100 chickens.

* * * * *

Q: Can cantaloupe be made into a frozen dessert?

A: A tasty sherbert has been made with pulped cantaloupe experimentally at Texas A & M College.

* * * * *

Q: How is our population growth affecting food needs?

A: Each day an average of 8000 new people have to be provided with food.

* * * * *

Q: How does the U. S. supply of "hard goods" compare with the rest of the world?

A: We have more than three-quarters of the world's automobiles, half the world's radios and telephones, a third of the world's railways, and 90 per cent of the world's bathtubs.

* * * * *

Q: Do plants produce antibodies that make them immune to repeated infection by a virus?

A: There is no evidence that plants can produce antibodies and virus infection usually persists for the life of the plant. In rare instances where the virus disappears, reinfection is still possible.

* * * * *

Q: What meat has the highest protein content?

A: Cooked veal is 28 per cent protein.

* * * * *

Q: How much more food will the U. S. need 20 years from now?

A: About 30 per cent more. Meat production will have to increase some 36 per cent. Incidentally, the farm labor force is expected to be 20 per cent lower by that time.

* * * * *

Q: What proportion of tractor accidents occur on the highway?

A: Last year, about one-third of the 1000 farmer fatalities due to tractor accidents was on the highways.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

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